Transportation Strategy

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THE US TRANSPORTATION Command's (USTRANSCOM's) mission is to provide air, land and sea transportation for the Department of Defense (DOD) in peace and war. Its customer base extends to the Federal Bureau of Investigation, Federal Emergency Management Agency, United Nations, US State Department, Army and Air Force Exchange Service, Defense Commissary Agency, Red Cross and US Department of Transportation. In the past, USTRANSCOM has focused on the strategic leg of the end-to-end transportation requirement. Today's vision is to provide timely, customer-focused global mobility in peace and war through efficient, effective and integrated transportation from origin to destination.

The Joint Strategic Capabilities Plan (JSCP) directs end-to-end, time-phased force deployment data (TPFDD) development, but planning processes and tools fail to support the requirement. The TPFDD analysis strategy must begin by assessing these processes' strengths and weaknesses, supporting doctrine and analysis tools. The military must review and implement necessary changes in planning processes to capitalize on strengths and identify areas in which to improve. Developing a sound strategy requires:

- Sound joint doctrine and training that recognize improvements in collaborative and distributive planning, command and control, in-transit visibility, modeling and simulation.
- A process and an integrated set of tools to support execution planning, TPFDD development and analysis from origin to tactical assembly area, including a link to war-gaming models that would provide tactical and operational warfighting analysis. Nowhere is this need more evident than in crisis action planning (CAP).
- Programmed analysis and war-gaming tools that will help develop and field the force structure needed to accomplish USTRANSCOM's mission as envisioned in Joint Vision 2010.
- Up-to-date, accurate databases that authentic sources provide.
- Flexibility.
- Being easy to implement.

An OPLAN or CONPLAN is considered transportation-feasible when the capability to move forces, equipment and supplies exists from origin to destination. This transportation-feasibility determination requires concurrent analysis and assessment of available strategic and theater lift assets, transportation infrastructure, and competing demands and restrictions.

USTRANSCOM's strategy depends on specific actions, performed at the precise time, relative to the deliberate planning cycle. Databases and models that rapidly analyze the TPFDD with a high degree of flexibility, fidelity and accuracy must support these actions. Additional tools will help compress the processes to develop an executable TPFDD within 72 hours. Increasing US support to smaller-scale contingencies and changing force structure and accelerated response times mandate optimizing this process.

USTRANSCOM's strategy is to develop a process for end-to-end transportation planning and analysis that becomes embedded in joint doctrine; results in rapid course-of-action (COA) development with TPFDD; and is supported by fast, accurate and easy-to-use automation tools. It is designed to support the Joint Vision 2020 power-projection concept by making TPFDD development an integral part of the joint force commander's decision-making process.

Doctrine

The JSCP tasks regional commanders in chief (CINCs) to prepare operation plans (OPLANs), contingency plans (CONPLANs) and functional plans.

No single model provides a seamless information flow from end to end at the desired level of detail. This is particularly evident during deliberate planning and CAP. USTRANSCOM must develop a set of flexible tools that can account for each segment of force projection. Developing "stovepiped" models that support a single purpose is not adequate.

All JSCP-tasked OPLANs and some CONPLANs are accompanied by a TPFDD, which is the Joint Operation Planning and Execution System (JOPES) database portion of the plan containing time-phased force data, unrelated unit cargo and personnel data, and movement plan data.

For OPLANs and CONPLANs with TPFDD, the JSCP states that the supported CINC will declare the plan end-to-end executable. An OPLAN or CONPLAN is considered transportation-feasible when the capability to move forces, equipment and supplies exists from origin to destination. This transportation-feasibility determination requires concurrent analysis and assessment of available strategic and theater lift assets, transportation infrastructure, and competing demands and restrictions.

To achieve this requirement, both supported and supporting CINCs are tasked to assess specific segments of the end-to-end transportation requirement. The supported CINC will analyze deployment; joint reception, staging, onward movement and integration (JRSOI); and theater distribution of forces, equipment and supplies to the final destination. As a supporting command, USTRANSCOM will assess the TPFDD's strategic leg for transportation feasibility. This assures the Chairman, Joint Chiefs of Staff, (CJCS) and the supported CINC that movements departing the port of embarkation (POE) and arriving at the port of debarkation (POD) are

Analysis Tools

Analysis of Mobility Platform (AMP)

AMP is used primarily to support programmatic analysis and exercises. USTRANSCOM J5 uses it to support the Future Analysis Cell during activation. Currently the only modeling and simulation system that allows end-to-end modeling is USTRANSCOM's AMP. AMP is a modeling shell that provides communication among three major mobility models—Model for Intertheater Deployment by Air and Sea (MIDAS), Enhanced Logistics Intratheater Support Tool (ELIST) and Continental United States (CONUS) ELIST. Using these three models, end-to-end modeling from origin to final destination can be accomplished. AMP also models prepositioned (afloat and ashore) and in-place assets and has an internal dynamic sustainment generator for all classes of supply and ammunition. AMP is a unique platform with which to analyze the strategic mode, determine ports and change events during a simulation run. The MIDAS model provides an end-to-end capability that moves cargo from origin to destination.

To obtain an enhanced answer to the end-to-end problem, MIDAS is linked, using flat data files, to CONUS ELIST and ELIST. CONUS ELIST and ELIST use the same database that provides a network of roads, railroads, bridges, assembly areas and other features that allow cargo and passengers to move through the Defense Transportation System (DTS) land transportation segment in CONUS and in theater. This model is limited because it does not use vehicles to move cargo. To simulate movement, a flow-capacity model is used for trucks, aircraft, helicopters, buses and other transport vehicles.

While AMP can measure end-to-end closure, initial scenario setup is time-consuming and does not provide interactive feedback from one model to the other. The AMP models do not interact at execution; they run sequentially. AMP has satisfactorily supported the nearly completed Mobility Requirements Study 05 study and the Focused Logistics War Game. It is currently being modified to support the Quadrennial Defense Review's Dynamic Commitment War Game.

Joint Flow and Analysis System for Transportation (JFAST)

JFAST is a software tool specifically designed to help planners rapidly assess the transportation feasibility of a course of action (COA). It supports the mobility analysis and refinement of OPLANs and CONPLANs with time-phased force and deployment data (TPFDD) as part of the deliberate planning process. It has proven valuable as a crisis-planning analysis tool. The currently fielded version of JFAST's scope is limited and includes modeling movement from origin to POD. However, for several years JFAST has been able to pass a flat file to ELIST. This JFAST output file projects scheduled arrivals at the POD as the input for ELIST analysis of intratheater movements. To provide a theater piece to JFAST, there are currently two thoughts. One

consistent with the supported CINC's assessment of JRSOI and theater distribution.

End-to-End Transportation Analysis

End-to-end modeling supports programmatic analysis, war games and exercises, planning, and execution analysis. Current modeling capabilities for the Defense Transportation System (DTS) simulate passenger and cargo flow beginning at the origin, through a POE, to a POD, then to a final destination in the theater. The capabilities of programs such as Analysis of Mobility Platform (AMP), Joint Flow and Analysis System for Transportation (JFAST), Enhanced Logistics Intratheater Support Tool (ELIST) and Joint Warfare System provide the tools needed to support these analyses.

A fully integrated model that is flexible, easy to use and compatible with other modeling systems is not yet available. While existing models can support one or more DTS segments effectively, no single model provides a seamless information flow from end to end at the desired level of detail. This is particularly evident during deliberate planning and

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CAP. USTRANSCOM must develop a set of flexible tools that can account for each segment of force projection. Developing "stovepiped" models that support a single purpose is not adequate. Developing a single model that supports all analysis requirements may or may not be successful and would require developing individual models to support planning, programmatics and war gaming.

The plan-development process follows a path as prescribed in the *User's Guide for JOPES (Joint Operation Planning and Execution System)* and Joint Manual 3122.02, *Time-Phased Force and Deployment Data (TPFDD) Development and*

is integrating JFAST and ELIST; the second is using the existing proven air, land and sea models in JFAST to model the complete end-to-end transportation requirement.

JFAST Version 8 extends this limited scope significantly. The first extension involves data-level integration of JFAST with the Mobilization and Deployment Capability Assurance Project (MADCAP) Integrated Management Initiative (MIMI) (also known as the Joint Partnership to Improve the Deployment Process). MIMI is a suite of tools the US Army Forces Command (FORSCOM) developed to analyze mobilization activities and compete for facilities at Army mobilization sites. Analysis results provide evaluated ready-to-load dates (the date each unit is ready to deploy) based on the reported readiness status and the mobilization requirements of every Active, Reserve and Guard unit.

The second extension involves adding a map-based planning interface to JFAST to allow the theater planner to define the intratheater movement requirements and concept of operations for intratheater transportation. The JOPES TPFDD is inadequate since it is limited to only five nodes per movement requirement (origin, POE, POD, destination and one intermediate location). In most cases, JOPES location reference files do not support detailed intratheater movement planning that may require identifying the positions of staging areas, marshaling areas, intermediate support bases and tactical assembly areas (TAAs) for each unit. JFAST Version 8 will provide a user-friendly interface to allow the supported commander in chief's planners to define intratheater movement requirements and use the existing proven air, land and sealift models in JFAST to assess the entire plan's end-to-end transportation feasibility (mobilization site to TAA). The planned initial operational capability for this JFAST Version 8 capability is June 2001.

Joint Warfare System (JWARS)

JWARS is currently being developed and may ultimately provide an end-to-end system that has all of AMP's capability and may be dynamically linked with a new war game model that will replace TACWAR. JWARS will have approximately 80 percent of AMP's functionality at initial operating capability and will have the remaining functionality approximately six months later. New functionality will be added to surpass AMP's capability and will be ready by the end of Fiscal Year 2001. Unique among current and future models will be the ability of the mobility model inside JWARS to receive feedback from the fight. JWARS will introduce events, such as port or canal closings, to dynamically alter cargo and passenger flow into the theater. This functionality will allow the user to modify the scenario and determine the effect on force projection. Once fully operational, JWARS will provide a true end-to-end analysis capability that will test COAs in war game environments and provide for the first time a mobility requirement during the fight. ■

Deployment Execution.* The deliberate planning section shows there are five formal phases: initiation, concept development, plan development, plan review and supporting plans.

Within the framework of plan development, TPFDD development and analysis and transportation feasibility estimates (TFE) occur, usually during three two-week TPFDD refinement conferences that the Joint Staff sponsors and USTRANSCOM hosts. Forces are selected and time-phased at the forces conference, support requirements are determined and time-phased at the logistics conference, and the strategic flow is analyzed through computer simulation using JFAST at the transportation conference.

The 911 team is a group of planners from USTRANSCOM, deployed on short notice to assist in regional CINC contingency planning efforts. These planners represent USTRANSCOM's planning and operations divisions. At the appropriate time, they deploy to provide transportation expertise to the supported CINC as early as the COA-development phase.

Integral to receiving plan approval, the TPFDD must undergo end-to-end analysis for transportation feasibility analysis. Since JSCP 98, the supported CINC has been responsible for declaring end-to-end feasibility. The phase ends when the CJCS receives the fully documented plan, including the TPFDD, for final review and approval.

Deliberate planning and CAP use JFAST to support transportation-feasibility analysis. JFAST models force and equipment movement from origin to POD only. While ELIST models force projection from POD to final destination, it has not been integrated into deliberate planning or CAP.

Deliberate planning uses the steps outlined in JOPES so TPFDD analysis occurs only when the supported CINC provides the TPFDD to USTRANSCOM for JFAST analysis. Throughout the three refinement conferences, gross transportation feasibility is achieved through a continual process of adjustments and analysis. This process occurs until the plan is error free and does not exceed JSCP apportionment by more than 5 percent on any given day. The inability to model JRSOI functions is a concern because the supported CINC must declare a plan end-to-end transportation-feasible without the essential tools to perform the final force movement segment—POD to destination.

This is not necessarily the case during CAP. There is an increasing demand for transportation feasibility estimates during the early stages of plan development. This support is requested as early as phase III, which includes COA development, and well before TPFDD development. The supported CINC needs models such as JFAST to generate time-phased, notional forces that support a given COA. This is a problem because there is a minimum threshold for required information below which no meaningful JFAST analysis can occur. At a macro level, JFAST contains substantial notional force packages a planner can use to estimate major forces' movement requirements. A planner who knows service doctrine should tailor force packages to fit the proposed COA. This tailoring accounts for the combat forces and the critical, often-overlooked, combat support and combat service support forces.

Supported CINCs can help this effort by identifying as many units as possible using the unit type code. This will allow JFAST analysts to more closely estimate the size and lift requirements for the forces the COA identified. However, realistic force time-phasing, which is essential for meaningful analysis, is still missing. The supported CINC must recognize these limitations and collaborate with USTRANSCOM to clarify the requirements and provide guidance on time-phasing.

The increasing need to support CAP requires supported CINCs to articulate their requirements clearly; supporting CINCs must clearly explain their ability to provide that support. Two initiatives that could assist in developing an effective process are the USTRANSCOM "911" teams and a JFAST letter of instruction (LOI) on CAP.

While the name may be a bit misleading, the 911 team is a group of planners from USTRANSCOM, deployed on short notice to assist in regional CINC contingency planning efforts. These planners represent USTRANSCOM's planning and operations divisions. At the appropriate time, they deploy to provide transportation expertise to the supported CINC as early as the COA-development phase. This direct support is short-term and should only be used when it will provide the greatest benefit to the supported CINC. Forward-deployed planners use JFAST to support the planning effort, yet this would

*Joint Publication, *User's Guide for JOPES (Joint Operation Planning and Execution System)* (Washington, D.C.: US Government Printing Office [GPO], 1 May 1995); Joint Manual 3122.02, *TPFDD Development and Deployment Execution* (Washington, D.C.: GPO, 9 December 1994).

CXS Transportation

M1 tanks painted for desert duty move to a US seaport.

Exercise staffs fail to assess the impact on force closure, port throughput, JRSOI and the CINC's strategic concept. This creates scenarios in which forces deploy without necessary support, troops deploy by strategic air much sooner or later than their equipment arrives by sealift, and CINC priorities are violated. Although changes will occur beginning at execution, staffs must exercise all of the steps involved in making those changes to appreciate the task's complexity and impact, and the time involved in reacting to those changes.

not preclude direct USTRANSCOM assistance. The recent introduction of the capability to post JFAST scenarios and plan sets to a remote server enables the supported CINC and the 911 team to reach back to USTRANSCOM for JFAST support.

In addition to the obvious need to provide planner-level support, recent events demonstrate the need to develop a JFAST LOI that would clearly outline JFAST's capabilities with the supported CINC's progress in plan development. The LOI will state the minimum information threshold for performing meaningful transportation analysis and the level of detail the supported CINC could expect. Planners cannot create the notional TPFDD required for COA gross transportation-feasibility assessment without substantial input from CINC or joint task force staff planners identifying specific above- and below-the-line force requirements, time-phasing and associated node locations.

Training and the Dynamic TPFDD

Training is fundamental to understanding the processes involved in TPFDD development and analysis. Exercises and war games must include requirements for staffs to build and manage TPFDDs

that support exercise training objectives. Attempts to implement a dynamic TPFDD during recent exercises suggest there is much staff training to do. Dynamic exercise play has been hampered by a lack of staff participation to assess the impact of changes to the TPFDD, failure to perform the validation process and unrealistic expectations that USTRANSCOM-managed DTS can immediately react to changing transportation requirements.

Database responsibility becomes increasingly important. The model's quality is directly related to the quality of the databases that support the model. Although the data associated with strategic lift has been successfully captured, maintenance of other databases is lacking, which degrades the model's quality and overestimates its ability to project forces.

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Challenges

Regardless of the type of planning, end-to-end TPFDD analysis is even more difficult because of variables that may significantly affect modeling results. Until recently, several important issues have been marginalized or completely overlooked during planning and the subsequent end-to-end TPFDD analysis. Planning factor databases include the Continental United States (CONUS), en route and theater.

As the models used to conduct end-to-end TPFDD analysis continue to improve, database responsibility becomes increasingly important. The model's quality is directly related to the quality of the databases that support the model. Although the data associated with strategic lift has been successfully captured, maintenance of other databases is lacking, which degrades the model's quality and overestimates its ability to project forces. Port throughputs, en route infrastructure and theater infrastructure are three examples of databases that suffer because a coordinated database-management process is lacking, which would identify executive agent responsibilities. This problem is compounded when database evaluation, validation and distribution are not synchronized with the TPFDD refinement time line.

The supported CINC determines theater POD throughput. While this is clearly understood, the information sources available to make these assessments and assign the limits on throughput are not coordinated. Available information sources include the Air Mobility Command (AMC); the Joint Intelligence Center, USTRANSCOM; the Military Traffic Management Command (MTMC) Transportation Engineering Agency; and the Defense Intelligence Agency. A coordinated process for fusing this diverse pool of information is lacking, resulting in a database that will not support the TPFDD refinement process.

Port throughput is not simply a function of the port's physical characteristics. Several other factors play critical roles in determining the throughput of a given port:

- Port handling and inland transportation assets.
- The time-phasing and capabilities of the organic AMC/MTMC units functioning as port managers.
- The degree of host nation or other nation contingency contracting, the logistics civil augmentation program and support available to the port manager.
- Road and rail networks.
- Marshaling areas.
- Combat support and combat service support units.
- Port support activities.
- Cargo transfer companies and other enablers.

Without an effective plan to conduct JRSOI, ports and marshaling areas will become congested and throughput will halt. This reinforces the need to model JRSOI and recognizes its contribution to end-to-end transportation feasibility.

These planning factors are not limited solely to capabilities of CONUS, en route and theater infrastructure. The most current data and doctrine for strategic air- and sealift must be used to move troops in support of JSCP taskings. The age of the strategic airlift fleet and its decreasing numbers and increasing changes to the Civil Reserve Air Fleet Pro-

USTRANSCOM's iron mountain of materiel near Dhahran, 1991.

US Army

The age of the strategic airlift fleet and its decreasing numbers and increasing changes to the Civil Reserve Air Fleet Program warrant annual review and update. Annually monitoring sealift capabilities is also necessary. Assessing USTRANSCOM's ability to move forces and their sustainment from origin to final destination is another necessity. Optimal force projection depends on the availability of rail cars, containers, commercial carriers, support personnel, and outload capabilities at depots and ports.

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POE-POD Selection

Crucial in developing effective, efficient, feasible transportation plans is allocating scarce transportation assets. Current deliberate planning processes rely on the supported CINC to determine the strategic transportation mode from POE to POD and to determine the POEs and PODs at the unit-line-number (ULN) level. Existing OPLANs, which have been through exhaustive staffing and analysis, are not affected. However, rapidly developed deployment plans lack such review. Having a model with mode- and port-determination algorithms available could greatly streamline planning and expedite analysis. Although such a model will not produce the final mode and port combinations for all requirements, it will provide an initial flow that is transportation-feasible and that CINC staffs can refine to meet their objectives.

This approach was designed in the Analysis of Mobility Platform-Model for Intertheater Deployment by Air and Sea (AMP-MIDAS) and should be used cautiously with execution planning. Although it is an end-to-end model, the CONUS and theater pieces are elementary and use a table of distances between PODs and destinations and between

US Army

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origins and POEs. These distances simulate road and rail movement to the POE and final destinations. Cargo and passengers do not actually move over a CONUS or theater network and cannot be constrained, which tends to provide an optimistic projection. A more accurate result comes from linking the MIDAS model with the ELIST models inside of AMP that provide road and rail networks with mobility resources. This link will provide a more robust answer. Using AMP-MIDAS for mode and port selection requires another caution: unit integrity is down to the ULN level, and in executing an OPLAN inside the model, ULNs from the same unit may be scheduled by a different mode. Careful model setup can reduce this problem. The future end-to-end model must link the theater piece with a CONUS piece through a scheduler at run time to determine mode and port selections. This capability currently does not exist in any of the mobility tools.

Readiness Ratings

Readiness ratings indicate a unit's preparedness to deploy and accomplish its mission. A lower readiness posture results in a longer period before a unit is fully manned, equipped and trained. This affects the ready-to-load date for that unit and will most likely result in the unit failing to meet the planned latest arrival date. In addition to the serious threat this may place on meeting the CINC's required dates, it affects the DTS as follows:

- MTMC's decisions on port openings.
- MTMC scheduling CONUS unit moves from origin to POE.
- AMC's strategic airlift scheduling.
- Military Sealift Command's decisions on sealift activation and ship scheduling.

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Although the joint logistics over the shore (JLOTS) operation was modeled inside of AMP at the Focused Logistics War Game, no existing models account for JLOTS in sufficient detail. Nonprogrammatic TPFDDs also fail to account for assets aboard pre-positioned ships. These shortfalls significantly affect associated JRSOI requirements. While these operations may not directly compete for port throughput, they do compete for manpower,

materiel- and cargo-handling equipment, transportation, supply, infrastructure and control assets that support JRSOI. These assets must be reflected in the TPFDD to ensure that accurate equipment densities are used in determining gross sustainment lift requirements during deliberate planning. Although these areas are covered today in supporting programmatic analysis, they are not accounted for in the execution planning process.

Ease of Use

The systems used to support TPFDD analysis strategy must be user-friendly. Systems are becoming more capable but also more complex. ELIST is working to make its model more user-friendly so it can operate without extensive contractor support. Staffs also have difficulty training sufficient personnel to use these systems. For example, hundreds of students each year train in JOPES, yet there is a shortage in the field. One possible solution is increasing civil service and contractor personnel at all levels of command. Another is to develop and assign personnel a military occupational specialty.

Planning and execution processes must adapt to business in the future. Doctrine and many of the system tools needed to perform end-to-end analysis have matured but require decisions about the next step to reduce the number of modeling and simulation systems. Realizing this vision requires refining planning and execution enablers to analyze force-projection requirements from end to end. These enablers must:

- Support deliberate planning and CAP.
- Support operations ranging from humanitarian assistance to the force-projection requirements of two nearly simultaneous MTWs.
- Provide real-time support to decision making at execution.
- Enhance the quality and value of joint and service exercises and training.
- Support modeling and simulation requirements for studies and analyses.

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- Focus on interoperability, flexibility, speed and accuracy.
- Reduce numbers while emulating the capabilities of the "best of show."

Effectively designed and applied, these tools will provide a seamless system that will facilitate force projection from origin to destination and provide a comprehensive end-to-end modeling capability. Concurrently, we must look for ways to optimize the process of projecting forces and sustainment with the goal of becoming "better, faster, cheaper."

We must assess the processes used to perform planning and execution requirements. Today, the supported CINC's needs are not satisfied by using the currently accepted methodology. We must conduct distributive and collaborative planning and analysis within and between headquarters. The USTRANSCOM 911 team concept is one example of how to leverage current capabilities. Doctrine must be constantly reviewed and modified to reflect new capabilities.

End-to-end TPFDD analysis can be a reality by applying the same vision that has provided the tools used today. The United States no longer has the forces, equipment and sustainment to perform an Operation *Desert Shield/Storm*-scale mission without exercising economy of force. Coupled with the high tempo of contingency support, we must use the most sensible combinations of forces and assets in an environment that requires speed and flexibility during planning and execution. ***MR***

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